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UNIVERSITI MALAYSIA SARAWAK
UNIMAS

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Foreword

The Scienceploration Camp is an initiative of the Centre for Pre-University Studies, UNIMAS, aimed to increase the interest in science among secondary school students and SPM leavers. The camp has two main objectives; to inspire and nurture future generations of experts in science, technology, engineering and mathematics (STEM) area and to increase the visibility of the Centre for Pre-University Studies as one of the best option for post secondary education.

The activities are designed to provide hands-on experiences to the participants, combining learning with fun-filled experiments.

It is hoped that the activities would deepen the participants' interest in science, particularly after they have completed their secondary school education and in preparation to embark onto their tertiary education.

Associate Professor Dr. Muna binti Sabri
Director
Centre for Pre-University Studies
UNIMAS

Note for Participants

The activities outlined for this Camp are to be carried out with close supervision from the experts, within the allocated venues. Engage your interests, ask questions, and relate what you have learned to your experiences.

Learning can be both fun and rewarding.

Contents

UNIMAS

Scienceploration Camp

Activity 1: Plant Matrix

OBJECTIVE(S):

1. To identify and understand the main parts and functions of a compound microscope.
2. To prepare a slide from plant tissue (onion) and sketch the cells under various magnifications.
3. To draw the components of a plant cell, and thereafter identify and indicate their position.

INTRODUCTION:

A cell is the basic unit of life. This experiment will examine onion samples in order to observe and identify the plant cells' components. The bulb of an onion is formed from modified leaves. While photosynthesis takes place in the leaves of an onion containing chloroplast, the glucose that is produced from this process is converted into starch (starch granules) and stored in the bulb. Chlorophyll and chloroplasts responsible for photosynthesis are only present in the leafy part of the onion (above ground) and are absent in the bulb (below ground).

APPARATUS:

- Compound microscope

MATERIALS:

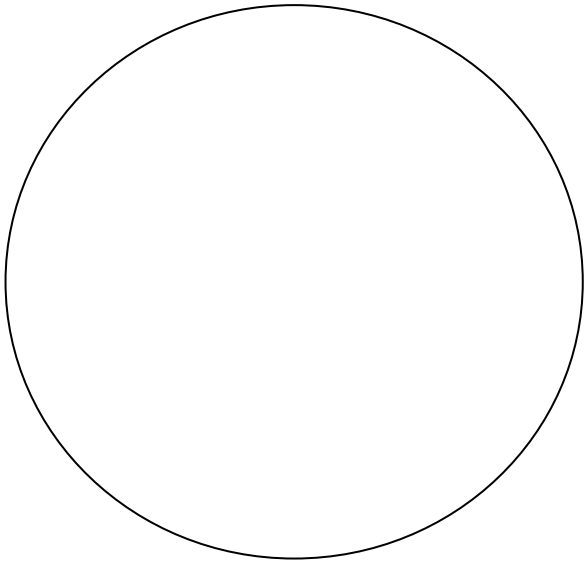
- Onion
- Water
- Iodine Solution
- Blotting paper
- Dropper
- Needle
- Microscopic cover slips
- Microscopic glass slides

METHOD:

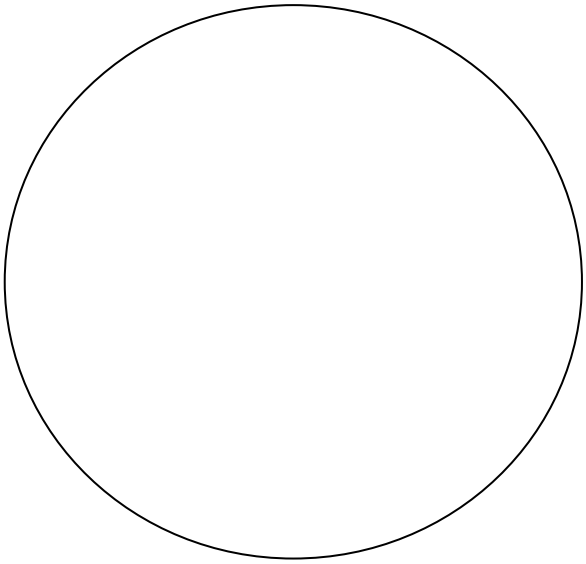
1. Add a drop of water at the center of the microscopic slide.
2. Peel of a thin membrane (translucent piece) from the onion layer and lay it at the center of the microscopic slide (the drop of water will help to flatten the membrane).
3. Add a drop of iodine (or methylene blue) solution onto the onion membrane.
4. Gently lay a microscopic cover slip on the membrane and press it down gently using a needle to remove air bubbles.
5. Touch a blotting paper on one side of the slide to drain excess iodine/water solution.
6. Place the slide on the microscope stage under low power objective.
7. Adjust focus for clarity to observe.
8. At minimum you should be able to observe the nucleus, cell wall and cytoplasm.

RESULTS:

Draw and labels the onion cells section.



Onion Leaf:
_____× magnification



Onion Bulb:
_____× magnification

DISCUSSION:

Complete the following table for the cell organelle found in onion leaf, onion bulb, or both. (Place an ✓ in the appropriate box).

Organelle	Onion Leaf	Onion Bulb	Function
Nucleus			
Cell Wall			
Chloroplast			
Cytoplasm			
Cell Membrane			

REFERENCE:

Solomon, E.P., Berg, L.R. and Martin, D.W. The Organisation of Life *in Biology 9th ed.* Brooks/Cole. Canada: CENGAGE Learning.

Activity 2: pHantastic Spectrum

OBJECTIVE(S):

1. To produce a natural pH indicator extracted from plant
2. To investigate the pH of solutions using the natural pH indicator

INTRODUCTION:

In acid-base reactions, pH indicators are used to indicate pH changes based on the indicators ability to change colour according to pH. The indicators are usually weak acids or bases, but their conjugate base or acid forms have different colors due to the differences in their absorption spectra. A natural pH indicator can be prepared from plants or flowers such as red cabbage (*Brassica oleracea*), hibiscus (*Hibiscus rosa-sinensis)*, berries and turmeric due to the presence of anthocyanins compounds. These compounds exhibit different colours in acidic and basic medium. Such natural indicator make a very good educational experiment to check the pH of solutions without using expensive pH meter and synthetic indicators.

APPARATUS:

- Test tubes
- Dropper
- Beakers
- pH indicator chart
- Measuring cylinder

MATERIALS:

- Leafy plants
- Flowers
- Hot water
- Samples

METHOD:

1. Chop up the leaf and add hot water to the leaves in a beaker.
2. Using a dropper, add a few drops of the indicator solution to the test tubes containing 2 mL of different samples.
3. Using a pH indicator chart, check and record the pH values by observing the colour of the sample solution.

RESULTS:

Sample	Colour of solution	pH

DISCUSSION:

1. What is the original colour of the natural pH indicator solution?
    A. Red
    B. Blue
    C. Green
    D. Purple

2. How many acidic samples were tested in this activity?
    _____

3. What is the pH of distilled water used in this activity?
    _____

4. pH indicator is commonly used in _____.
    A. electrolysis
    B. saponification
    C. contact process
    D. acid-base titration

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Khan, P. M. A., & Farooqui, M. (2011). Analytical Applications of Plant Extract as Natural pH Indicator: A Review. *Journal of Advanced Scientific Research*, *2*(4), 20–27.

Rhonda L. Stoddard & Scott McIndoe, J. (2013). The Color-Changing Sports Drink: An Ingestible Demonstration. *Journal of Chemical Education*, *90* (8), 1032-1034.